

Application No. 10/586,264
Amdt. Dated: June-26-2009
Reply to Office Action: Feb-26-2009

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Amendments to the Specification:

Please replace the paragraphs [0008] and [0009] beginning at page 2, with the following amended paragraphs [0008] and [0009]:

[0008] It has now surprisingly been found that a [[novel]] canola protein isolate having an increased proportion of 2S protein, preferably containing at least about 85 wt% of 2S protein, and having a reduced proportion of 7S protein exhibits superior properties in aqueous solution to the supernatant-derived canola protein isolate prepared following the procedure of the aforementioned US Patent Application No. 10/137,391.

[0009] In addition to improved solubility at a variety of pH values, the [[novel]] canola protein isolate provided herein is able to provide improved clarity in solution with soft drinks, providing clear protein fortified soft drinks.

Please replace the paragraphs [0012] and [0013] beginning at page 3, with the following amended paragraphs [0012] and [0013]:

[0012] The [[novel]] canola protein isolate may be prepared by thermal treatment of the concentrated supernatant from the procedure of US Patent Application No. 10/137,391 in order to reduce the proportion of 7S protein in the concentrated supernatant and hence to increase the proportion of 2S protein. Accordingly, in another aspect of the present invention, there is provided a process for the preparation of a canola protein isolate having an increased proportion of 2S canola protein, which comprises (a) providing an aqueous solution of 2S and 7S proteins consisting predominantly of 2S protein, (b) heat treating the aqueous solution to cause precipitation of 7S canola protein, (c) removing degraded 7S protein from the aqueous solution, and (d) recovering a canola protein isolate having a protein content of at least about 90 wt% (N x 6.25) d.b. and having an increased proportion of 2S canola protein.

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[0013] Alternatively, the [[novel]] canola protein isolate may be prepared by a procedure in which, following extraction of protein from the canola oil seed meal, the protein solution is subjected to a first selective membrane step with a membrane having a molecular weight cut-off which permits the 2S protein to pass through the membrane in a permeate while the 7S and 12S proteins are retained in a retentate. The retentate then is dried to provide a first canola protein isolate which is predominantly 7S protein. The permeate from the first selective membrane process step is then subjected to a second selective membrane step with a membrane having a molecular weight cut-off which retains the 2S protein and permits low molecular weight contaminants, including salt, phenolics and anti-nutritional materials, to pass through. The retentate from the latter selective membrane step then is dried to provide a second canola protein isolate which is predominantly 2S protein and which is the [[novel]] protein isolate.

Please replace the paragraphs [0016] to [0019] beginning at page 4, with the following amended paragraphs [0016] to [0019]:

[0016] The [[novel]] canola protein isolate provided herein has a protein content of at least about 90 wt% (N x 6.25), preferably at least about 100 wt%, and may be isolated from canola oil seed meal by a batch process, or a continuous process, or a semi-continuous process.

[0017] The [[novel]] canola protein isolate provided herein consists predominantly of 2S protein and has an increased proportion of 2S canola protein and a decreased proportion of 7S canola protein when compared to canola protein isolates consisting predominantly of 2S protein and derived from supernatant from canola protein micelle formation and precipitation and prepared under the same experimental conditions of preparation.

[0018] The [[novel]] canola protein isolates contain at least about 85 wt% of 2S canola protein and less than about 15 wt% of 7S canola protein,

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preferably at least about 90 wt% of 2S canola protein and less than about 10 wt% of 7S canola protein and more preferably as great a proportion of 2S protein as is possible. As noted above, such canola protein isolate may be obtained by heat treatment of concentrated supernatant, as described in more detail below. The heat treatment of the concentrated supernatant causes precipitation of the 7S protein, which can be removed from the heat-treated supernatant by any convenient means, such as centrifugation. The 2S protein is not affected by the heat treatment and hence the heat treatment increases the proportion of 2S protein present by decreasing the proportion of 7S protein.

[0019] The [[novel]] canola protein isolate is soluble in aqueous solution over a wide range of pH values, generally having greater solubility than canola protein isolate consisting predominantly of 2S protein and derived from supernatant from canola protein micelle formation and precipitation under the same experimental conditions of preparation. In addition, aqueous solutions of the [[novel]] canola protein isolate in soft drinks, including carbonated soft drinks, such as those commercially-available, have a greater clarity than such aqueous solutions produced from canola protein isolate consisting predominantly of 2S protein and derived from supernatant from canola protein micelle formation and precipitation under the same conditions of preparation.

Please replace the paragraph [0039] beginning at page 9, with the following amended paragraph [0039]:

[0039] The aqueous protein solution may be processed in two alternative procedures, depending on whether 7S-rich protein micellar mass is to be precipitated to leave a supernatant for processing to form the [[novel]] canola protein isolate, or the aqueous protein solution is to be processed by a two-membrane operation without precipitation of protein micellar mass to obtain the [[novel]] canola protein isolate.

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Please replace the paragraph [0069] to [0071] beginning at page 16, with the following amended paragraph [0069] to [0071]:

[0069] The concentrated heat-treated supernatant, after removal of the degraded 7S protein, such as by centrifugation, may be dried by any convenient technique, such as spray drying or freeze drying, to a dry form to provide a canola protein isolate in accordance with the present invention. Such [[novel]] canola protein isolate has a high protein content, in excess of about 90 wt%, preferably at least about 100 wt% protein (calculated as Kjeldahl N x 6.25) and is substantially undenatured (as determined by differential scanning calorimetry).

[0070] Such [[novel]] canola protein isolate contains a high proportion of 2S protein, preferably at least 90 wt% and most preferably at least about 95 wt%, of the canola protein in the isolate.

[0071] In an alternative procedure to produce the [[novel]] canola protein isolate, the aqueous protein solution produced by extraction of the canola oil seed protein meal is concentrated to increase the protein concentration thereof while maintaining the ionic strength thereof substantially constant by a first ultrafiltration step using membranes, such as hollow-fibre membranes or spiral wound membranes, having a molecular weight cut-off sufficient to retain the 7S and 12S proteins in a retentate and to permit 2S protein to pass through the membrane. A suitable molecular weight cut-off range for the membrane is from about 30,000 to about 150,000 daltons, preferably about 50,000 to about 100,000 daltons. For continuous operation, the membranes are dimensioned to permit the desired degree of concentration as the aqueous protein solution passes through the membranes.

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Please replace the paragraph [0087] beginning at page 20, with the following amended paragraph [0087]:

[0087] Referring to Figure 1, there is shown therein the [[novel]] two-membrane process provided in accordance with one aspect of the invention in comparison to the formation of canola protein isolates (CPIs) by the micelle route.

Please replace the paragraph [0092] beginning at page 20, with the following amended paragraph [0092]:

[0092] As described above, the retentate from the latter ultrafiltration step may be heat-treated to reduce the proportion of 7S protein in the retentate and to provide the [[novel]] canola protein isolate of the invention.

Please replace the paragraph [0093] beginning at page 20, with the following amended paragraph [0093]:

[0093] This Example describes the production of a [[novel]] canola protein isolate in accordance with one embodiment of the invention.

Please replace the paragraph [00129] beginning at page 27, with the following amended paragraph [00129]:

[00129] This Example illustrates an alternative process of forming the [[novel]] canola protein isolate of the invention (Figure 1).

Please replace the paragraph [00148] beginning at page 30, with the following amended paragraph [00148]:

[00148] In summary of this disclosure, a [[novel]] canola protein isolate having an increased content of 2S protein and a reduced quantity of 7S protein is provided having utility in producing clear aqueous solutions,

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particularly in soft drinks. Modifications are possible within the scope of the invention.